SUMMARY

Cigarette smoking is a leading contributor to illness and death among world populations nowadays. Although cigarette smoking is proven to cause many negative effect, people continue to consume cigarettes on a regular basis. Nicotine, one of the most common component abuse through cigarette and is a major public health problem. It is highly toxic and absorbed quickly through the respiratory tract, mouth mucosa and skin during smoking (Cancer Research UK, 2016). Cigarette smoking has been linked strongly to following illness such as heart disease, stroke, hypertension, respiratory disease, infertility and even cancer (John and Rajat, 2004).

The research was done by exposing nicotine per inhalation to male rats (*Rattus norvegicus*) to observe the changes in diameter and epithelium thickness of seminiferous tubules. The purpose of this research is to provide a detail information for the smokers as they can start to concern about the negative impact of nicotine (cigarette smoking) on male fertility.

In this research, pure liquid nicotine is given to all four experimental groups by inhalation using a special designed smoking chamber to produce nicotine mist. The nebulizer (Omron Nebulizer NE C28) will then uses oxygen, compressed air or ultrasonic power to break up nicotine solutions and suspensions into small aerosol droplets that can be directly flows into the gas chamber through the tubes. The nicotine dosage that are used in this research is 0.5mg/kg, 1mg/kg, 2mg/kg, and 4mg/kg for each treatment. (Adrien *et al*., 2014).

The results showed that was a significant decrease ($P<0.05$) in the mean diamater of seminiferous tubules that received nicotine treatment 4.0mg/kg when compared with their control. However, treatment groups such as 0.5mg/kg, 1.0mg/kg and 2.0mg/kg showed an insignificant decrease ($P>0.05$) in their mean diameter of seminiferous tubules when compared with the control. On the other hand, the results showed a decrease in the epithelium thickness after the administration of nicotine per inhalation. Epithelium thickness in the control group showed a non significant decrease ($P>0.05$) componed with those of the experimental group with administration of nicotine with dose of 0.5mg/kg, however shows significant decrease ($P<0.05$) with other nicotine experimental group with administration nicotine with dose of 1.0mg/kg, 2.0mg/kg and 4.0mg/kg.

Nicotine in cigarette smoke can cause the adrenal medulla affecting the central nervous system, disrupting the feedback mechanism between hypothalamus, anterior pituitary and testicles (Anita, 2004). The relationship between the hypothalamus, anterior pituitary plays a major role in reproductive process. The hypothalamus regulates hormones called gonadotropin releasing hormone or also called as Gonadotropin Releasing Hormone (GnRH) and signals the anterior pituitary. GnRh is a hormone which causes the release of two gonadotropin hormone named as Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH) (Guyton, 1997). When the feedback mechanism of hypothalamus-anterior pituitary-testicles are affected, the synthesis of testosterone and spermatogenesis will also be affected. Nicotine affects the work of the central

nervous system by inhibiting the work of GnRH so that the formation of FSH and LH is inhibited. With the inhibition of FSH and LH formation, spermatogenesis runs abnormally and causes the diameter and epithelium thickness of seminiferous tubules to decrease.

THE EFFECT OF NICOTINE PER INHALATION ON THE DIAMETER AND EPITHELIUM THICKNESS OF THE SEMINIFEROUS TUBULES OF MALE RATS *(Rattus norvegicus*)

Yew Shi En

ABSTRACT

Nicotine is a pharmacologically active component of the tobacco that adversely affects the male reproductive system and fertility. Nicotine administration in experimental animals was found to affect spermatogenesis, epididymal sperm count, motility and the fertilizing potential of sperms. The goal of this work is to assess the level of testicular damage by observing the changes in the diameter and epithelium thickness of seminiferous tubules in male rats that were given nicotine administration per inhalation. Male adult rats were used and divided into five treatment groups; Control group (NaCl 0.9%), P1 (Nicotine 0.5mg/kg), P2 (Nicotine 1.0mg/kg), P3 (Nicotine 2.0mg/kg) and P4 (Nicotine 4.0mg/kg). All groups were given treatment per inhalation for twenty days. The rats were sacrificed where testes were collected for histopathology preparation. The testes were processed for routine paraffin embedding and staining and the sections were examined for histopathological changes. The results show that nicotine administration had an effect on induced varying degrees of structural damage to the seminiferous tubules, with an average decreased diamater and epithelium thickness of seminiferous tubules. The diameter and epithelium thickness of seminiferous tubules in four experimental groups (P1,P2,P3 and P4) reduced compared to the Control group (C). In conclusion, this study proves that nicotine administration does decreases the spermatogenesis of male reproductive system by reducing the diameter and epithelium thickness of seminiferous tubules in testes. It also proves that the level of testicular damage is directly proportional to the dosage of nicotine administrated to male rats.

Key words: nicotine, tubules seminiferous diameter, epithelium thickness, testes.